

REMARKS

The present claims relate to a rubber composition.

Amendment summary

Upon entry of this Amendment, claims 1-15 will be all the claims pending in the present application.

Claim 1 is amended to recite that the rubber component consists of natural rubber and/or polyisoprene rubber (IR). Support for this amendment is found, e.g., in Paragraph No. [0016] of the present specification.

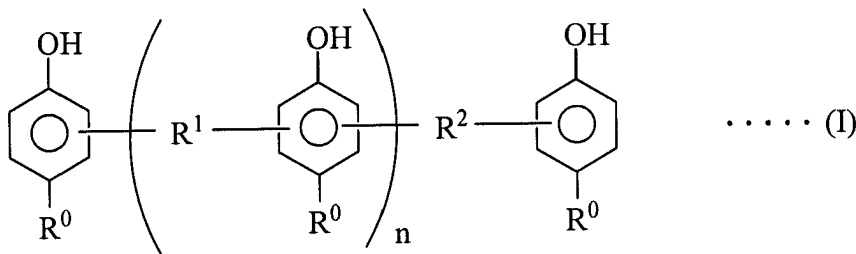
No new matter is added by this Amendment, and Applicants respectfully submit that entry of this Amendment is proper.

Status of the claims

Claims 1, 2, 4-9, 11, 13, and 14 have been rejected under 35 U.S.C. § 102(b) as allegedly being anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as allegedly being unpatentable over Ajiro et al. (EP 967244) (hereinafter "Ajiro"). In addition, Claims 1-15 have been rejected under 35 U.S.C. § 103(a) as allegedly being obvious over Ajiro in view of Numata et al. (U.S. Patent No. 3,960,982) (hereinafter "Numata"). Finally, Claims 1, 5 and 6 have been rejected under 35 U.S.C. § 102(b) as allegedly being anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as allegedly being obvious over Vredenburg et al. (U.S. Patent No. 3,674,723) (hereinafter "Vredenburg").

Response to claim rejections based on Ajiro

The present claims recite a rubber composition characterized by compounding a rubber component consisting of natural rubber and/or polyisoprene rubber with a phenolic resin represented by the following formula (I):



wherein R^0 is a hydrogen atom, an alkyl group, a phenyl group or a methylol group. Each of R^1 and R^2 is an arylene group, an alkylene group having a carbon number of 2-10, an aralkylene group, a cycloalkenylene group or a cycloalkadienylene group. N is 0-10.

As described in Paragraph Nos. [0007] and [0014-0015] of the present specification, R^2 in the resin of the present invention is a bivalent group, and in the case where R^2 is an alkylene group, R^2 has a carbon number of 2-10. The phenolic resin recited in the present claims has, for example, improved dispersibility in the rubber component and the deterioration of the fracture resistance is suppressed.

Applicants respectfully submit that Ajiro does not anticipate or render obvious the presently claimed invention because (1) the rubber composition in Ajiro utilizes at least 50 parts by weight of SBR; (2) the phenolic resin disclosed in Ajiro does not correspond to the presently recited in phenolic resin; and (3) the presently claimed invention provides for improved dispersibility in the rubber component and the suppression of the deterioration of the fracture resistance.

Applicants respectfully submit that Ajiro does not anticipate or render obvious the present claims because Ajiro discloses a rubber composition that includes at least 50 parts by weight of SBR. The present claims, on the other hand, recite a rubber composition consisting of natural rubber and/or polyisoprene rubber. Accordingly, Applicants respectfully submit that Ajiro does not anticipate or render obvious the presently claimed invention.

In addition, instead of the presently recited phenolic resin, Ajiro discloses a phenolic resin corresponding to the phenolic resin of the formula (II), which is described on page 3 of the present specification and which does not correspond to the presently recited phenolic resin. Specifically, Applicants note that the group corresponding to R^2 in the present claims is methylene group ($-CH_2-$) in the phenolic resin disclosed in Ajiro. Accordingly, Applicants respectfully submit that Ajiro does not disclose or teach the presently claimed invention.

In addition, Applicants note that, as discussed in Paragraph No. [0012] of the present specification, resin of Ajiro (the resin of formula (II) as discussed in the present specification) is low in the dispersibility in the rubber component having a low polarity (such as natural rubber or the like), and also fracture resistance or the like is deteriorated. Applicants respectfully submit that this is another reason that Ajiro does not disclose or teach the presently claimed invention.

Applicants further respectfully submit that Ajiro does not anticipate or render obvious the presently claimed invention because the presently claimed invention provides for improved dispersibility in the rubber component and the suppression of the deterioration of the fracture resistance.

The solubility parameter (SP value) is a known standard for judging polarity or compatibility. An SP value can be determined by a Fedors method, which is well-known in the

art. The SP values of NR, SBR, the biphenylene type phenolic resin of Example 2 of the present specification, and the phenolic resin of Ajiro are as follows:

NR: 8.24 (J/cm³)

SBR: 8.4-9

Phenolic resin of Example 2 of the present specification: 10.39

Phenolic resin of Ajiro: 13.54

The SP value of NR (or IR) as a rubber component is lower than that of SBR. When the SP value of the phenolic resin is high, the absolute value of the difference between the SP values (Δ SP value) between the rubber and the phenolic resin becomes larger, which illustrates that the properties of the composition, when using NR, are deteriorated when compared to the properties of the composition using SBR. Accordingly, when a phenolic resin having a larger SP value is used in NR system, the compatibility is low and the dispersibility of the resin is lower, and the fracture resistance and the like is deteriorated. Since the SP value of the resin of Example 2 of the present specification is considerably smaller than that of the resin of Ajiro, as more completely discussed above, the absolute value of the Δ SP value in an NR system becomes small and hence the dispersibility is enhanced to improve the properties.

Accordingly, Applicants respectfully submit that Ajiro does not disclose or teach the presently claimed invention because the presently claimed invention provides for improved dispersibility in the rubber component and the suppression of the deterioration of the fracture resistance.

Applicants acknowledge that Numata has been cited as allegedly teaching the phenolic resins of present claim 3. However, Numata does not cure the above deficiencies in Ajiro.

Accordingly, Applicants respectfully submit that neither Ajiro nor Numata, either alone or in combination, anticipate or render obvious the presently claimed invention. Applicants therefore respectfully request the reconsideration and withdrawal of the §§ 102/103 rejection based on Ajiro and the § 103 rejection based upon Ajiro in view of Numata.

Response to rejection based on Vredenburg

Applicants respectfully submit that the present claims recite a rubber composition characterized by compounding a rubber component consisting of natural rubber and/or polyisoprene rubber with a phenolic resin represented by formula (I). Vredenburg discloses a rubber composition that is a blend of natural rubber and SBR. Accordingly, Applicants respectfully submit that Vredenburg does not anticipate or render obvious the presently claimed invention.

Accordingly, Applicants respectfully submit that Vredenburg does not anticipate or render obvious the present claims.

Applicants therefore respectfully request the reconsideration and withdrawal of the §§ 102/103 rejection based on Vredenburg.

Conclusion

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

AMENDMENT UNDER 37 C.F.R. § 1.111
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The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,

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